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NONSKID, ALL SIZE FOOTWEAR SPIKES

TASK 01-T-73

by

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Final Report

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INTRODUCTION

During a liaison visit to USAREUR during January and February 1974, it was noted that operating personnel of tracked vehicles experienced extreme difficulty in keeping their footing when negotiating over ice-covered surfaces of the vehicle. Although it was not known whether any injury had resulted from this hazardous condition, it was obvious that a convenient and expedient means to assure firm footing was required.

DESCRIPTION OF ITEM

The Footwear Spikes (see Figure 1) are a two-piece strap assembly with a series of small diameter tungsten-tipped spikes molded in natural rubber. The item is designed to fit all shoe, boot, overshoe and Arctic Vapor boot sizes without adjustment. This is accomplished by proportional positioning of the spikes in the rubber strap, so that as the strap is stretched, the spikes are separated accordingly. The ends are secured by two button snaps integral to the strap.

When worn, the spikes afford positive footing on ice-covered exterior surfaces of combat vehicles. They can also be used for walking on glazed ice or hard-packed snow. Although designed primarily for use on icy surfaces, several other advantages can be realized, such as crossing large streams which contain slippery rocks or climbing large rock masses or slopes.

These spikes are not to be considered as a substitute for crampons.



Figure 1. Nonskid, All Size Footwear Spikes-Two Views Of Spikes Employed

SCOPE OF WORK

In order to assure that development of special footwear for this problem did not represent duplication of effort, a thorough and comprehensive study was made of existing military and commercial footwear or accessories to determine what might be available. Efforts concentrated primarily on footwear accessories that were adjustable and relatively low in cost. None were found.

Adjustable crampon type devices were not only cumbersome but difficult to adjust and wear. Rubber overshoes with spikes similar to the type used by golfers were not acceptable because of the rounded tip of the spike ends and because many sizes of overshoe would necessarily be required to fit the varying types of footwear.

A prototype pair of footwear spikes was first fabricated from strips of sheet rubber. The spikes were made by hard soldering pieces of 1/32" diameter tungsten rod into a brass rivet-type body so the tip protruded approximately 1/16". These were then attached to the rubber strap by flaring. The footwear spikes conform to the sole and heel area of any shoe, boot, or overshoe, by having a self-adjusting characteristic, i.e., as the rubber strap is stretched to conform to the sole or heel width, the spikes are proportionately moved apart, thereby locating the spikes equally along the ball of the foot. This stretch feature is shown on the footwear in Figure 1. When walking or running there is no foot discomfort or instability due to the very small tip area.

This prototype was first tested on a piece of steel sheeting which was covered with glaze ice and placed at an angle of 20 degrees. The wearer successfully climbed the iced sheet and could stand in any position on the slope. This was made possible by the very small diameter tungsten tips penetrating the ice layer, i.e., with 14 spikes on each pair of straps, a 150 pound individual produces approximately 13,000 psi on each tip. This high loading feature also gives the user the capability of walking on most surfaces when sure footing would be desirable, i.e., scaling large boulders or metal surfaces which would not be adversely damaged by the small indentations or scratches created by the tungsten tips.

METHOD OF EVALUATION

An M113 APC was deliberately iced using a light spray of water during sub-freezing weather. This created a thin sheet of ice approximately 1/8" thick on the entire vehicle. The spikes were put on over the standard army boot and the evaluator successfully mounted to the top of the vehicle without experiencing any slippage. Once on top of the vehicle, the evaluator continued to walk on the turret and other flat surfaces with relative confidence. A test was later conducted on large rock formations with the same results. In addition, a stream which had rocks that were covered with moss was crossed several times with little or no slipping. Upon successful completion of the concept evaluation, several hundred pair were produced. A black natural rubber of 55 - 60 durometer was selected. The spike inserts were prefabricated and molded in place by conventional low cost compression molding techniques. Cotton stress tab inserts were used for reinforcement at the snap and spike areas of the strap.

FINAL EVALUATION

As of this writing, 100 pair of the All-Size Footwear Spikes have been sent to 1st Brigade, 2nd Infantry Division, APO 96224. An additional 40 pair have been sent to Headquarters, US Army Alaska for their evaluation.

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CONCLUSIONS

The following conclusions are based on limited testing by the developer at or near Aberdeen Proving Ground, MD.

1. The All-Size Footwear Spikes are capable of providing sure footing for personnel involved in operations where icy or other slippery conditions exist.
2. The unique self-adjusting feature of the straps permits a fit on all shoes, boots, overshoes, and arctic vapor barrier boots regardless of size.
3. The spikes are comfortable to wear, do not damage or chaff foot gear and, because of their low profile and snug fit, do not appear to have any undesirable safety features. Under certain conditions, especially on steep slopes, the user may be required to accurately position his foot prior to a shift of body weight.

RECOMMENDATION

Subject to receipt of favorable reports of field evaluation, it is recommended that the AMC Parent Agency take appropriate action to complete development and standardize the All-Size, Nonskid Footwear Spikes for issue to units operating in environments and conditions where unsure footing can hamper the effectiveness of the individual.

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